

# C S 52B: ADVANCED SWITCHING & CAMPUS LAN DESIGN (CCNP)

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	4.5
Hours:	4 lecture, 2 laboratory per week (72 total per quarter)
Advisory:	C S 50C or equivalent experience.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

## Student Learning Outcomes

- The student will demonstrate the knowledge of three first-hop redundancy protocols, HSRP, GLBP, and VRRP,
- The student will demonstrate the application and configuration of private VLANs.

## Description

The course provides the knowledge and skills necessary to plan, configure and verify the implementation of complex enterprise switching solutions using Cisco's Campus Enterprise Architecture. Secure integration of VLANs, WLANs, voice and video into campus networks is also provided. The material is presented in a lecture and discussion format supplemented by comprehensive laboratory exercises. This course uses the official Cisco Academy CCNP SWITCH curriculum and is designed to provide preparation for the CCNP SWITCH certification exam.

## Course Objectives

The student will be able to:

- Implement VLAN based solution, given a network design and a set of requirements
- Implement a security extension of a Layer 2 solution, given a network design and a set of requirements
- Implement switch based Layer 3 services, given a network design and a set of requirements
- Explain how to prepare infrastructure to support advanced services
- Implement high availability, given a network design and a set of requirements

## Course Content

- Implement VLAN based solution, given a network design and a set of requirements
  - Determine network resources needed for implementing a VLAN based solution on a network
  - Create a VLAN based implementation plan
  - Create a VLAN based verification plan
  - Configure switch-to-switch connectivity for the VLAN based solution

- Configure loop prevention for the VLAN based solution
  - Configure access ports for the VLAN based solution
  - Verify the VLAN based solution was implemented properly using show and debug commands
  - Document the verification after implementing a VLAN solution
- Implement a security extension of a Layer 2 solution, given a network design and a set of requirements
    - Determine network resources needed for implementing a security solution
    - Create a implementation plan for the security solution
    - Create a verification plan for the security solution
    - Configure port security features
    - Configure general switch security features
    - Configure private VLANs
    - Configure VACL and PACL
    - Verify the security based solution was implemented properly using show and debug commands
    - Document the verification results after implementing a security solution
  - Implement switch based Layer 3 services, given a network design and a set of requirements
    - Determine network resources needed for implementing a switch based Layer 3 solution
    - Create an implementation plan for the switch based Layer 3 solution
    - Create a verification plan for the switch based Layer 3 solution
    - Configure routing interfaces
    - Configure Layer 3 security
    - Verify the switch based Layer 3 solution was implemented properly using show and debug commands
    - Document the verification results after implementing a switch based Layer 3 solution
  - Prepare infrastructure to support advanced services
    - Implement a wireless extension of a Layer 2 solution
    - Implement a VoIP support solution
    - Implement video support solution
  - Implement high availability, given a network design and a set of requirements
    - Determine network resources needed for implementing high availability on a network
    - Create a high availability implementation plan
    - Create a high availability verification plan
    - Implement first hop redundancy protocols
    - Implement switch supervisor redundancy
    - Verify high availability solution was implemented properly using show and debug commands
    - Document results of high availability implementation and verification

## Lab Content

- Clearing a switch connected to a larger network
  - Clear the configuration of a switch that is connected to other switches and prepare it for a new lab
- Static VLANs, VLAN trunking, and VTP domains and modes
  - Set up a VTP domain
  - Create and maintain VLANs
  - Configure ISL and 802.1Q trunking
- Per-VLAN Spanning Tree behavior
  - Observe the behavior of a separate Spanning Tree instance per VLAN
  - Change Spanning Tree mode to rapid Spanning Tree
- VLANs, VTP, and inter-VLAN routing - case study
  - Plan and design the International Travel Agency switched network as shown in the diagram and described in the textbook

2. Implement the design on the switches and router
3. Verify that all configurations are operational and functioning according to the requirements
- E. Hot Standby Router Protocol (HSRP)
  1. Configure inter-VLAN routing with HSRP to provide redundant, fault-tolerant routing to the internal network
- F. Securing Layer 2 switches
  1. Secure the Layer 2 network against MAC flood attacks
  2. Prevent DHCP spoofing attacks
  3. Prevent unauthorized access to the network using AAA and 802.1X
  4. Securing Spanning Tree protocol
- G. Secure the Layer 2 Spanning-Tree topology with BPDU guard
  1. Protect the primary and secondary root bridge with root guard
  2. Protect switch ports from unidirectional links with UDLD
- H. Voice and security in a switched network - case study
  1. Plan, design, and implement the International Travel Agency switched network as shown in the diagram and described in the textbook
  2. Implement the design on the lab set of switches
  3. Verify that all configurations are operational and functioning according to the guidelines

## Special Facilities and/or Equipment

- A. Access to a network laboratory with current Cisco network equipment host computers required to support the class.
- B. Website or course management system with an assignment posting component (through which all lab assignments are to be submitted) and a forum component (where students can discuss course material and receive help from the instructor). This applies to all sections, including on-campus (i.e., face-to-face) offerings.
- C. When taught via Foothill Global Access, a fully functional and maintained course management system through which the instructor and students can interact.
- D. When taught via Foothill Global Access, students must have currently existing email accounts and ongoing access to computers with internet capabilities.

## Method(s) of Evaluation

- Tests and quizzes
- Written laboratory assignments
- Final examination

## Method(s) of Instruction

- Lectures which include motivation for the architecture of the specific topics being discussed
- In-person or online labs (for all sections, including those meeting face-to-face/on-campus), consisting of:
1. An assignment webpage located on a college-hosted course management system or other department-approved internet environment. Here, the students will review the specification of each assignment and submit their completed lab work
  2. A discussion webpage located on a college-hosted course management system or other department-approved internet environment. Here, students can request assistance from the instructor and interact publicly with other class members
- Detailed review of laboratory assignments which includes model solutions and specific comments on the student submissions
- In-person or online discussion which engages students and instructor in an ongoing dialog pertaining to all aspects of designing, implementing and analyzing programs
- When course is taught fully online:

1. Instructor-authored lecture materials, handouts, syllabus, assignments, tests, and other relevant course material will be delivered through a college-hosted course management system or other department-approved internet environment
2. Additional instructional guidelines for this course are listed in the attached addendum of CS department online practices

## Representative Text(s) and Other Materials

Edgeworth, Bradley. CCNP Enterprise Core ENCOR 350-401 and Advanced Routing ENARSI 300-410 Official Cert Guide Library. 2020.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- A. Reading
  1. Textbook assigned reading averaging 60 pages per week.
  2. Online resources as directed by instructor though links pertinent to networking.
  3. Library and reference material directed by instructor through course handouts.
- B. Writing
  1. Technical prose documentation that supports and describes the laboratory exercises that are submitted for a grade.

## Discipline(s)

Computer Science